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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/559,827

12/06/2005

Hiroaki Takehara

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EXAMINER

MCCRACKEN, DANIEL

ART UNIT

PAPER NUMBER

1793

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/559,827	<b>Applicant(s)</b> TAKEHARA, HIROAKI	
	<b>Examiner</b> DANIEL C. MCCracken	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12/6/2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 13-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/6/2005</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

Citation to the Specification will be in the following format (S. # : L) where # denotes the page number and L denotes the line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

### ***Information Disclosure Statement***

The Examiner has considered the relevance of all foreign patent documents insofar as the translated abstract indicates. “The duty of candor does not require that the applicant translate every foreign reference, but only that the applicant refrain from submitting partial translations and concise explanations that it knows will misdirect the examiner’s attention from the reference’s relevant teaching.” *Semiconductor Energy Laboratory Co. v. Samsung Electronics Co.*, 204 F.3d 1368, 1378, 54 USPQ2d 1001 1008 (Fed. Cir. 2000).

Applicants have submitted documents with 4 pages reduced and reproduced onto one. This fails to comply with 37 C.F.R. 1.98(a)(2) which requires a legible copy of each foreign patent be submitted. The Examiner has crossed out those references considered to be illegible. If Applicants want them considered, legible copies should be submitted.

If this case has received an office action in Japan, the Examiner requests the prior art cited against it, as he considers it material to patentability.

### ***Remarks***

Applicants preliminary amendment filed 12/6/2005 (cancelling Claims 1-12 and presenting new Claims 13-28) has been received and will be entered.

### ***Drawings***

New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because it is not entirely clear what Applicants are showing is new. The drawings are quite clearly lifted from the Alford/Diener group's patents. *See e.g.* US 2003/0041732. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13 and 15-16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to Claim 13, Applicants recite a discharge rate of a gas, but claim this in terms of a velocity. Gas flow rates recite a volume, *e.g.* SCFH, etc. With respect to Claims 15-16, the numbers recited are not dimensionless. While presumably they would have the units of V and P as claimed, this should be made explicit for clarity. All other claims import the defects of the claims from which they depend.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The entire reference teaches each and every limitation of the rejected claims. The pinpoint citations provided are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 13-16 are rejected under 35 U.S.C. 102(a) as being anticipated by Yoshikawa, et al., *PAH and fullerene formation from low pressure combustion under various flame condition*, 41<sup>st</sup> Symposium on Combustion, December 3-5, 2003 (hereafter “Yoshikawa at \_\_,” citation to the English translation provided). The additional authors of Yoshikawa and the PCT filing date serve as the basis for application of Yoshikawa under 102(a).

With respect to Claim 13, Yoshikawa discloses a flame synthesis method for making fullerenes with the claimed reagents and flow conditions. *See* (Yoshikawa at 1) (“2. Experimental apparatus and process,” noting the hydrocarbon and oxygen) *and* (Yoshikawa at 5) (“Table 1,” teaching the gas velocity). Similarly, as to Claims 14-16, see Table 1 of Yoshikawa.

Claims 13-16 are rejected under 35 U.S.C. 102(a) as being anticipated by JP 2003-192318 to Hiroaki, et al. (Mitsubishi Chemical). The PCT filing date and the additional inventor

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on the Hiroaki reference serve as the basis for application of Hiroaki under 102(a). Citation will be made to paragraph number of the English translation provided.

With respect to Claim 13-14, Hiroaki discloses a method for making of making fullerenes with the claimed velocity. *See* (Hiroaki [0018]) (“10-100 cm/sec”). As to Claims 15-16, Hiroaki teaches pressures to meet the claimed limitation. *Id.*

Claims 13 and 15-16 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,273,729 to Howard, et al.

With respect to Claim 13, Howard (in addition to generally teaching flame synthesis of fullerenes, *see* 3: 24 *et seq.*) recites the claimed velocity. *See e.g.* (Howard "Table 1"). Note that oxygen is added. (Howard 3: 29) (“benzene and oxygen”). As to Claims 15-16, pressures are taught that would meet the limitation. (Howard “Table 1”).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The references cited teach each and every limitation of the rejected claims. The pinpoint citations provided are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,273,729 to Howard, et al.

The preceding discussion of Howard accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. To the extent Howard may not teach the claimed temperatures, and with respect Claim 14, Howard teaches that “on an industrial scale, gas velocities could be much higher.” (Howard 2: 49-51). Thus, one would be motivated to use a higher gas flow rate for any number of reasons, for example scaling up a process. Furthermore, Howard teaches the effect of gas flow rate on soot generation. *See* (Howard “Tables 1-2”). Stated differently, flow rate is a result-effective variable, the optimization of which does not impart patentability. *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980).

Claims 13-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2004/0057896 to Kronholm, et al.

With respect to Claims 13-16, Kronholm generally teaches combustion synthesis of fullerenes. (Kronholm, entire document). With respect to the claimed velocity, Kronholm reports

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gas flow in terms of standard liters per minute (SLPM). *See e.g.* (Kronholm 11: [0106]). Kronholm may not recite dimensions of the pipe that introduces the fuel/air mix, hence a calculation of the velocity was precluded. This does not impart patentability however. Kronholm is quite explicit on this being a process condition that can be controlled and/or optimized. *See* (Kronholm 4: [0048]) (nothing the effect of residence times). Optimization does not impart patentability. *In re Boesch*, 205 USPQ at 219. Scaling a reactor up or down is hardly inventive. Note that the pressures taught by Kronholm appear to be the same as those disclosed by Applicants. *Compare e.g.* (Kronholm 11: [0106]) *with* (S. 16: 5). Thus it is expected that the VP value is the same or readily optimized.

With respect to Claims 17-22 and 25-26, Kronholm recites a separation scheme (i.e. recovery device). Note the temperatures. (Kronholm 7: 0072]). Cooling is taught. (Kronholm 7: [0073]). With respect to Claims 23-24 and 28, the gas content and yeild are known result effective variables. *See e.g.* (Kronholm 4: [0048], "Examples"). Optimizing them does not impart patentability.

Claims 13-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over 2004/0057896 to Kronholm, et al. as applied to claim 12-26 and 28 above, and further in view of US 2003/0041732 to Alford .

The preceding discussion of Kronholm accompanying the obviousness rejection is expressly incorporated herein by reference. With respect to Claim 27, orientation of the reactor is an obvious design choice. To the extent one of ordinary skill in the art would not recognize this, Alford conveniently provides ample motivation to arrange the reactor as claimed. *See* (Alford 6:



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[0053]) (“This is especially useful for horizontal or downflowing synthesis methods, *as gravity assists the product into the receptor or collector.*”) (emphasis added).

Furthermore, to the extent Kronholm may not disclose whatever separation scheme Applicants are trying to Claim, it is quite clearly lifted from Alford. *Compare* (S. "Figs") *with* (Alford "Fig. 2"). The Examiner considers this to be very strong *secondary indicia of obviousness*. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR International Co. v. Teleflex, Inc.*, 550 US \_\_\_, 82 USPQ2d 1385, 1397 (2007). Using known synthesis techniques (i.e. flame synthesis/Kronholm) and known separation techniques (Alford) in a predictable manner is not inventive.

Claims 13-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,273,729 to Howard, et al as applied to claims 13-16 above, and further in view of US 2003/0044342 to Alford, et al. and JP 06-056414 to Katsuhide, et al.

The preceding discussion of Howard accompanying the obviousness rejection is expressly incorporated herein by reference. To the extent Howard *may not* disclose the separation scheme as set forth in claims 17-22 and 24-28 Alford does. See discussion above and note that Applicants have copied the Alford patent. As to Claim 23, the C/O ratio is taught. (Howard 2: 41-54). See above with respect to optimization. As to Claim 27, Katsuhide (like Alford) recognizes the advantages of reactor orientation. *See* (Katsuhide, “abstract”) (“the sooty product containing the produced fullerene compound is effectively dropped”) (recognizing – like Alford, and to the extent it was not obvious on its face – that gravity exists, and it makes things fall.).

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***Conclusion***

Many more rejections could have been crafted. The Howard/MIT group has done extensive work in this area. Using the Alford separation scheme (and copying the pictures from their patent application!) is prima facie obvious.

All amendments made in response to this Office Action must be accompanied by a pinpoint citation to the Specification (i.e. page and paragraph or line number) to indicate where Applicants are drawing their support.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel C. McCracken whose telephone number is (571) 272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel C. McCracken/

/Stuart Hendrickson/

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Examiner, Art Unit 1793  
DCM

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